Management of *Tuta absoluta*

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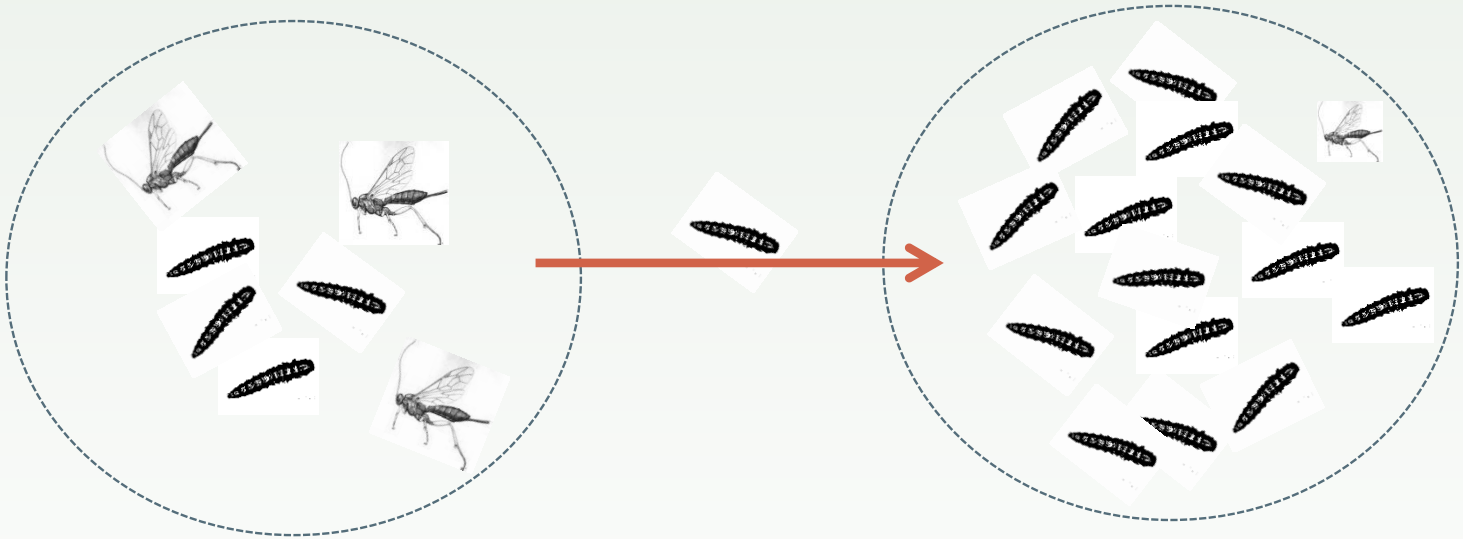
Tuta absoluta: an invasive alien species

Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.

(UICN 2002)

Why is this pest a threat?

The « **enemy release** » hypothesis



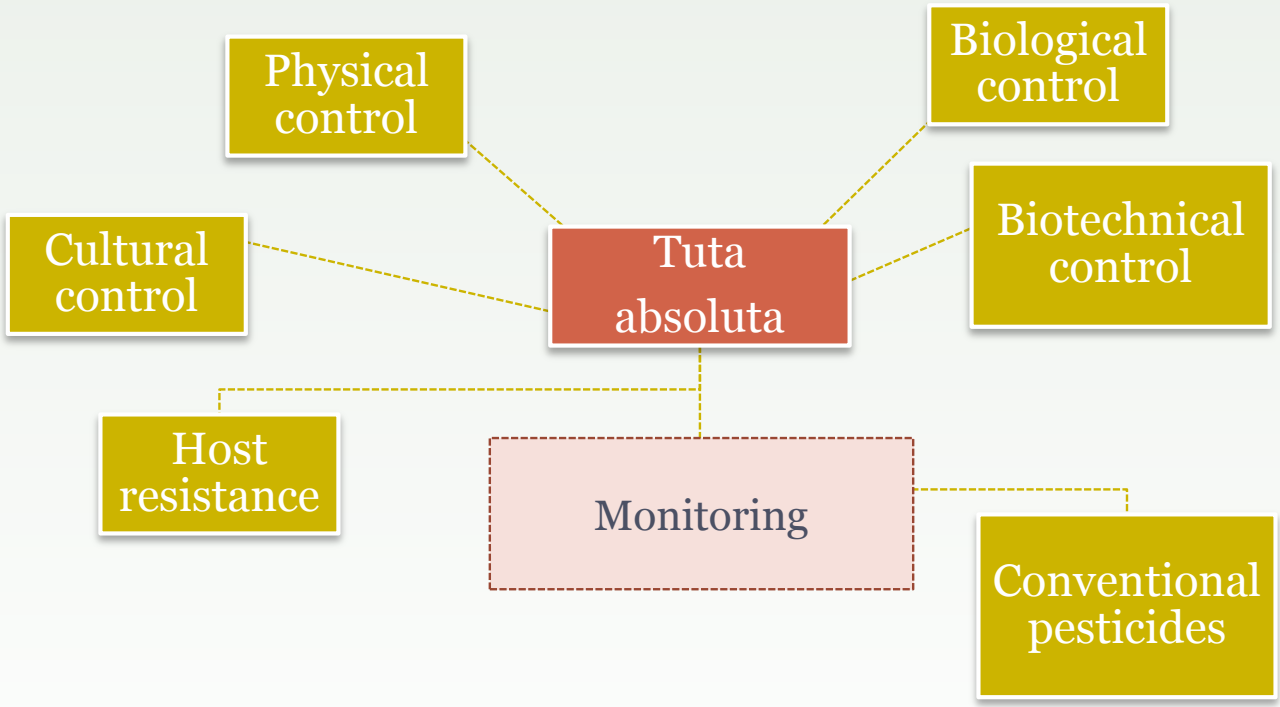
Native area

Newly invaded area

(Keane and Crawley 2002)

Integrated management of *Tuta absoluta*

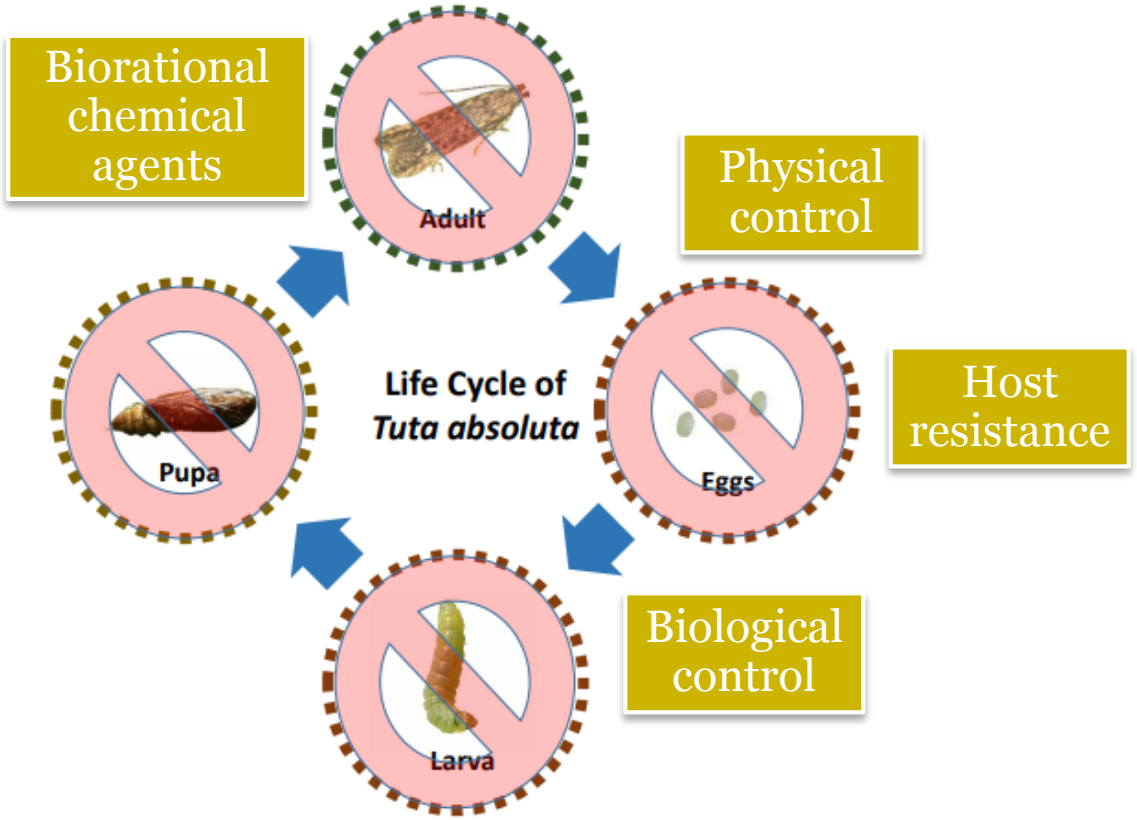
A sound combination of tools…



(adapted from Eilenberg et al. 2001)

Integrated management of *Tuta absoluta*

…targeting each stage of the pest.



Monitoring

- ✓ Pheromone traps - 2-4 traps/ha and weekly observation
- ✓ Egg/larvae or damage sampling

Spray only when necessary, with as selective as possible insecticides

Cultural control

- ✓ Destroy previous crop residue.
- ✓ Remove host weeds near the field or greenhouse.
- ✓ Check the seedlings before transplanting to ensure they are free of eggs and larvae.
- ✓ Remove and destroy any infected leaves, shoots and fruit immediately.

Physical control

- ✓ Grow tomato seedlings inside a netted nursery.
- ✓ Double check the net to make sure the greenhouse does not have holes or gaps.
- ✓ Install a secure door in the greenhouse to prevent moths from entering.

Host plant resistance

- ✓ Breeding resistant host plants

  Constitutive defenses

  Induced defenses

(Biondi et al. 2018)

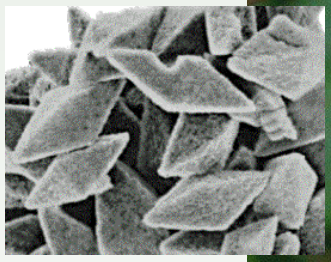
Biotechnical control

- ✓ Mass trapping (20-25 traps/ha greenhouse, 40-50 open field)
- ✓ Mating disruption (30-60 g of pheromone/ha)

(Capparos et al. 2013, Vacas et al. 2011, Cocco et al. 2013)

Biological control

The use of living organisms to keep pests below damaging levels .



(Biondi et al. 2018)

Generalist predators

Nesidiocoris tenuis and *Macrolophus pygmaeus* (Hemiptera, Miridae)

Egg parasitoids

Trichogramma achaeae (Hymeno., Trichogrammatidae)

Larval parasitoids

Stenomesius japonicus and *Necremnus tutae* (Hymenoptera, Eulophidae)

Entomopathogens

Bacillus thuringiensis var. kurstaki or aizawaii

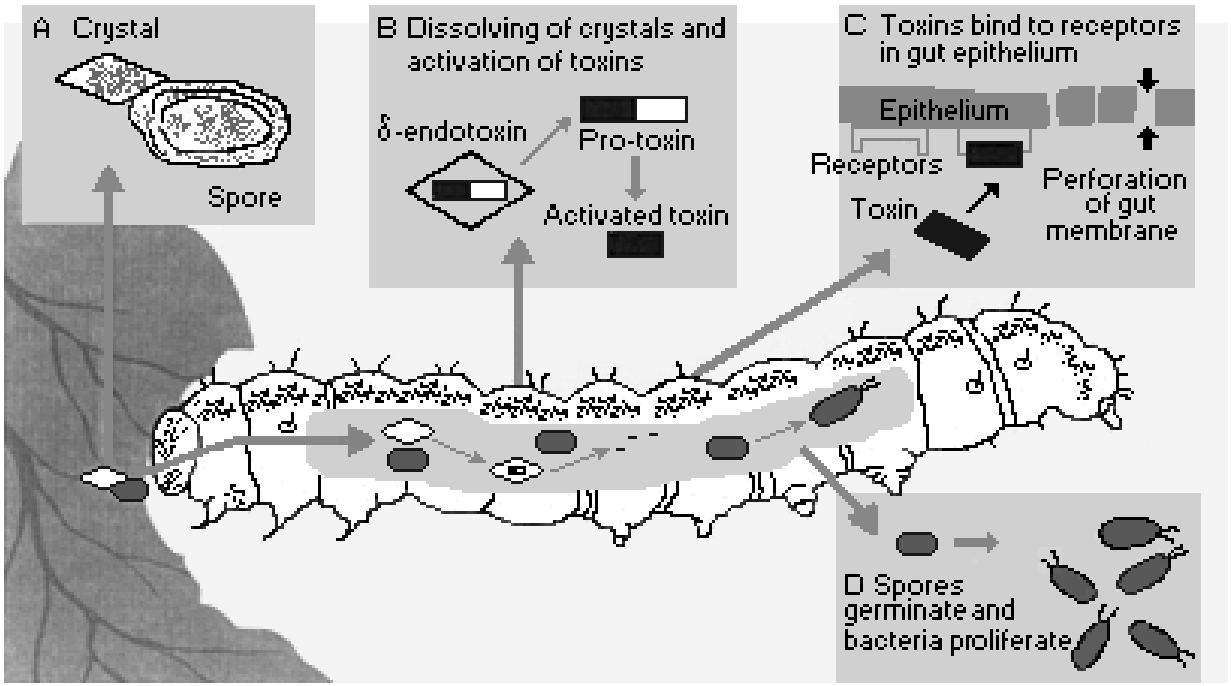


Fig. 1. Mechanism of toxicity of Bt

Biological control

Augmentative	Classical	Conservation
T. achaeae (inundative) *M. Pygmaeus* *N. tenuis* (inoculative)	.....	Banker plants Trophic resources Refuges

Towards a system-wide management

ANNUAL REVIEWS

Annual Review of Entomology

Ecology, Worldwide Spread, and Management of the Invasive South American Tomato Pinworm, *Tuta absoluta*: Past, Present, and Future

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